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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/880,467	06/13/2001	Serafim Batzoglou	WHI-002	5218

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EXAMINER

MORAN, MARJORIE A

ART UNIT PAPER NUMBER

1631

DATE MAILED: 04/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/880,467	BATZOGLOU ET AL.	
	Examiner	Art Unit	
	Marjorie A. Moran	1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

In view of the amendment filed 2/4/04, the rejections to the claims made under 35 USC 112 are hereby withdrawn.

Drawings

The proposed amendments to Figure 3 are approved by the examiner. It is noted that proposed amendments to Figures 4, 7, and 8 were approved by the examiner in the Office Action of 10/1/03.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 17-19 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by ANSON et al. (Proc. 3rd Annual Int'l Conf. Computat. Molec. Biol. (4/1999) pages 1-9).

ANSON teaches a method of assembling DNA from a plurality of shotgun "reads", wherein the reads comprise end-sequences from either end of a larger fragment and wherein his shotgun read information further comprises distance and orientation information with regard to each pair of end-reads (p. 1). ANSON merges his reads, compares linking information, particularly orientation, identifies repeat and unique

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regions, and links reads according to linking (overlap) information of the unique regions (pp. 3-6), thus anticipating claims 17-19. ANSON teaches that his method is performed on a computer (e.g. p. 5), therefore claim 21 is also anticipated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-21 rejected under 35 U.S.C. 103(a) as being unpatentable over ANSON et al. (Proc. 3rd Annual Int'l Conf. Computat. Molec. Biol. (4/1999) pages 1-9) in view of AMITAI et al. (US 6,625,545, filed 8/13/98).

Claim 1 recites a method of assembling a plurality of genomic reads (sequences) by providing a plurality of reads from a genomic region, from the plurality of reads, indexing a plurality of read subsequences according to read number, extracting from the indexed subsequences and plurality of read pairs with selected subsequences in common, and merging the read pairs along a continuum. Claim 2 limits the plurality of reads to be generated by sequencing both ends of a plurality of DNA segments wherein each read is associated with linking information comprising orientation and distance of reads on either end of a DNA fragment. Claim 3 limits the plurality of reads to comprise reverse complements. Claim 4 limits the method to further comprise sorting the indexed subsequences alphabetically. Claim 5 limits the method to further comprise discarding read subsequences with more than a cutoff number of occurrences from the indexed subsequences. Claim 6 limits the plurality of read subsequences to be the same length. Claim 7 limits the length to be 12-32 bases. Claim 8 limits the method to further comprise indexing the indexed subsequences according to a starting position on the read. Claim 9 limits the merging step of the method to comprise aligning read pairs with a selected number of common subsequences according to sequence similarity. Claim 10 limits the aligning to further comprise comparing the associated positions on the reads with which subsequences correspond, to verify overlap. Claim 11 limits the method of claim 2 to one comprising determining linking information for the reads, and determining linking information for the merged read pairs, then comparing the reads and read pairs for consistency. Claim 12 recites limitations similar to claim 11, and further recites identifying an ambiguity in the merged reads by comparing the linking

information of reads versus read pairs. Claim 13 limits the method of claim 12 to identifying a repeat region and unique regions. Claims 14 and 16 limit the method of claim 13 to linking unique regions, and merging linked pairs of unique regions. Claim 20 is directed to a computer-readable medium comprising a program for performing a method similar to claim 1.

ANSON teaches a method of providing sequences (i.e. reads) comprising end-reads and having associated linking information, as set forth above. ANSON further teaches that sequences with too many repeats (i.e. more than a cutoff number) are discarded (p. 4), and teaches correlating linking information of end-reads to that of merged segments in order to verify merged regions (p. 5). As ANSON's sequences are genomic, his data necessarily comprises sequence information of both "forward" and complementary reads. ANSON does not teach indexing his sequences before merging them.

AMITAI teaches assembling, or clustering EST sequences by indexing short regions of the EST's, then identifying matching regions (col. 4, lines 10-30). AMITAI teaches that his indexed sequences may be re-indexed, and teaches a variety of criteria for indexing (col. 4, lines 22-29). AMITAI teaches that his subsequences for indexing may be any size, and specifically exemplifies 9 base sequences (i.e. "about 12", column 4, lines 31-35).

It would have been obvious to one of ordinary skill in the art at the time of invention to have indexed (sorted) the end-reads of ANSON according to order of appearance (i.e. read number), consecutive order (alphabetical), or any other desired

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criterion, as taught by AMITAI, where the motivation would have been to facilitate the method by avoiding "brute-force" methods of finding matches among many sequences in large database, as taught by AMITAI. One skilled in the art would reasonably have expected success in indexing the end-reads of ANSON before any merging operations because both ANSON and AMITAI teach assembly of larger fragment of DNA by first comparing smaller associated sequences, wherein AMITAI's indexing merely organizes the data associated with smaller regions before assembly.

Conclusion

Claims 1-21 are rejected.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marjorie A. Moran whose telephone number is (571) 272-0720. The examiner can normally be reached on Mon. to Wed, 7:30-4; Thurs 7:30-6; Fri 7-1 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Woodward can be reached on (571)272-0722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

mam

Marjorie A. Moran
Primary Examiner
Art Unit 1631

Marjorie A. Moran
4/22/04